Manual of Instructions

MODEL 5105

Data Modem Series

RFL Industries, Inc.

Boonton, New Jersey, U.S.A.

Manual of Instructions

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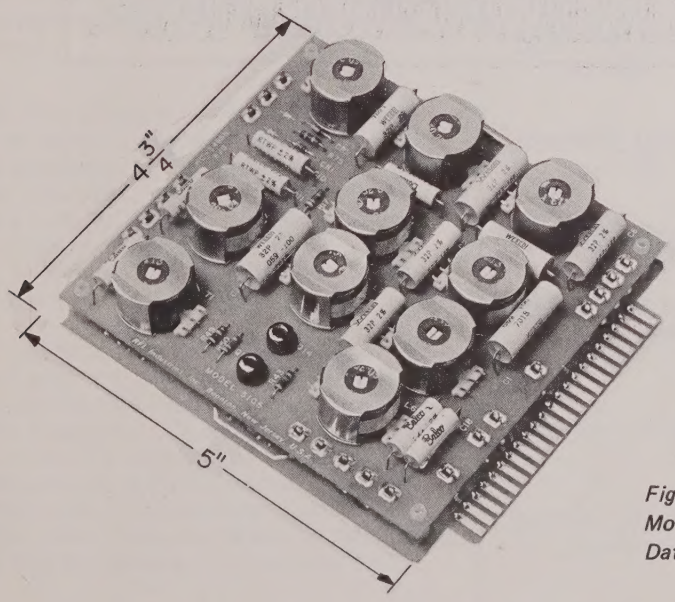


Figure 1.
Model 5105
Data Modem

RFL Industries, Inc.
Boonton, New Jersey, U. S. A.

Book No. MA-34850A

Warranty

RFL Model 5105 Data Modem Series carries a warranty of 12 months from date of delivery for any part which fails during normal operation or service. A deficient part should be returned to the factory, shipping charges prepaid, for replacement f.o.b. Boonton, New Jersey.

RFL Industries, Inc.
Boonton, New Jersey, U. S. A.

DESCRIPTION

The RFL Model 5105 Data Modem Series are single card only modular type and are supplied as Bell 101, 103, and 113 Series compatible, or as meeting C.C.I.T.T. recommendations. Variations in the units are delineated in Table 2 with their various applications.

TTY, EIA, and TTL/DTL interfaces are available in all units and are determined by strapping options. Strapping for the more commonly used interfaces are shown in Figures 2 thru 7. For other interfaces not shown, consult the RFL sales engineering group.

The modem consists of an FSK Transmitter and Receiver mounted in one double deck module. The frequency determining components are on a single piggy-back card that plugs into the main board. In general, this auxiliary filter board should be treated as a nonrepairable assembly and should be returned to the factory.

The 5105 module occupies a space 5" H x 4¾" D x 1½" W and plugs into a 22 pin edge connector (Cinch P/N 250-22-30-210) or equivalent. See Figure 1.

ADJUSTMENTS

There are five adjustments on the 5105. All are factory preset for strapping options in which the unit is shipped. The proper equipment should be used to make the following adjustments:

BFO ADJUST: This adjustment pertains to those units having BFO for higher transmission speed. The BFO adjustment is preadjusted at the factory and will not normally need adjustment unless the filter board is replaced. Adjustment is made by rotating the slug of L9 on the filter board and noting the frequency on the collector of Q16 with an Electronic Frequency Counter. It should be set for 3830 Hz.

FREQUENCY ADJUST: This is on all models and it must be made after the BFO Adjust, if applicable. Again it will not normally require adjustment unless the filter board is replaced. It is made by rotating the slug of L6 on the filter card and noting the output frequency with a counter at the transmitter output with the unit properly loaded. All units should be adjusted for the Transmitter center frequency shown in Table 2, plus or minus 100 Hz, depending on the input binary state.

NOTE

Only L6 and L9 slugs should be adjusted on the filter board. The others are filter adjustments and any attempt to readjust these may necessitate returning the unit to the factory for realignment.

TRANSMITTER LEVEL: This is factory preset at -7 dBm. If it is necessary to readjust it, the level may be set at the transmitter output (properly loaded), using an AC VTVM. An approximate scale is noted on the control for convenience.

RECEIVER SENSITIVITY: This is factory preset at -40 dBm and will take care of most installations. The sensitivity can be set to -45 dBm when required.

RECEIVER BIAS: This is factory preset and normally will not need further adjustment. For optimum operation, it will require readjustment if switching options from EIA to TTY or TTL, or vice versa; however, if proper equipment and personnel are not available, it would be best not to attempt readjustment. A dotting generator and a VOM or oscilloscope are required. The transmitter is keyed with reversals at the intended operating bit rate and the receiver bias is adjusted for equal pulses out on the oscilloscope or an average DC reading on the voltmeter.

TABLE 1
Technical Data Summary

Transmitter Output Level: Adjustable from -30 to +2 dBm.

Transmitter Output Stability: +1.5 dBm from -20°C to +65°C.

Receiver Sensitivity: +2 to -45 dBm adjustable.

Carrier Input or Output Impedance: 600 or 900 ohms, nominal, isolated, and balanced, 2W or 4W.

Operation: Full-duplex on 2W or 4W lines.

Operating Speed: Up to 300 baud. Other similar models up to 600 baud.

Modulation: Asynchronous FSK.

Operating Temperature: -20°C to +65°C.

Power Requirements: +12V @ 85 mA regulated, and -12V @ 5 mA for EIA and C.C.I.T.T. only.

TABLE 2

Model No.	Main Board No.	Filter Board No.	Send Freq.	Receive Freq.	Adj. Sens.	Carrier On-Off Option	Carrier Detect	BFO	Remarks
5105	HB-34853	HB-34855	1170 Hz	2125 Hz	Yes	Yes	Yes	Yes	Originate Freq. Western Electric 103 Compatible
5105	HB-35012	HB-34855	1170 Hz	2125 Hz	No	Yes	No	Yes	
5105	HB-34742	HB-34743	1170 Hz	2125 Hz	Yes	Yes	Yes	No	
5105	HB-34747	HB-34743	1170 Hz	2125 Hz	No	Yes	No	No	
5105	HB-34853	HB-35340	2125 Hz	1170 Hz	Yes	Yes	Yes	Yes	Answer Freq. Western Electric 103 Compatible
5105	HB-35012	HB-35340	2125 Hz	1170 Hz	No	Yes	No	Yes	
5105	HB-34742	HB-35341	2125 Hz	1170 Hz	Yes	Yes	Yes	No	
5105	HB-34747	HB-35341	2125 Hz	1170 Hz	No	Yes	No	No	
5105	HB-34853	HB-35342	1080 Hz	1750 Hz	Yes	No	Yes	Yes	Originate Freq. C.C.I.T.T.
5105	HB-34747	HB-35343	1080 Hz	1750 Hz	No	No	No	No	
5105	HB-34853	HB-35344	1750 Hz	1080 Hz	Yes	No	Yes	Yes	Answer Freq. C.C.I.T.T.
5105	HB-34747	HB-35345	1750 Hz	1080 Hz	No	No	No	No	

TABLE 3

ELECTRICAL INTERFACES

	Freq.	State	Bit	EIA Int.	TTY Int.	TTL Int.
TRANSMIT	C.F. +100 Hz	Mark	1	-3 to -25V	Keyboard Closed	0V
	C.F. -100 Hz	Space	0	+3 to +25V	Keyboard Open	+5V
RECEIVE	C.F. +100 Hz	Mark	1	-5 to -25V	20 mA Current	0V (sinked)
	C.F. -100 Hz	Space	0	+5 to +25V	No Current	+5V

TABLE 4

CONNECTIONS FOR MODEL 33 TELETYPEWRITER

	Model 5105 Pin Conn.	Model 33 Block X Conn.	Model 33 Plug 2 Conn.
RECEIVE	#10	#6	#7
	#11	#7	#8
TRANSMIT	#19 (& #12 for HDX)	#4	#6
	#21	#3	#5

NOTE: The Model 33 should be strapped for full-duplex, 20 mA operation.

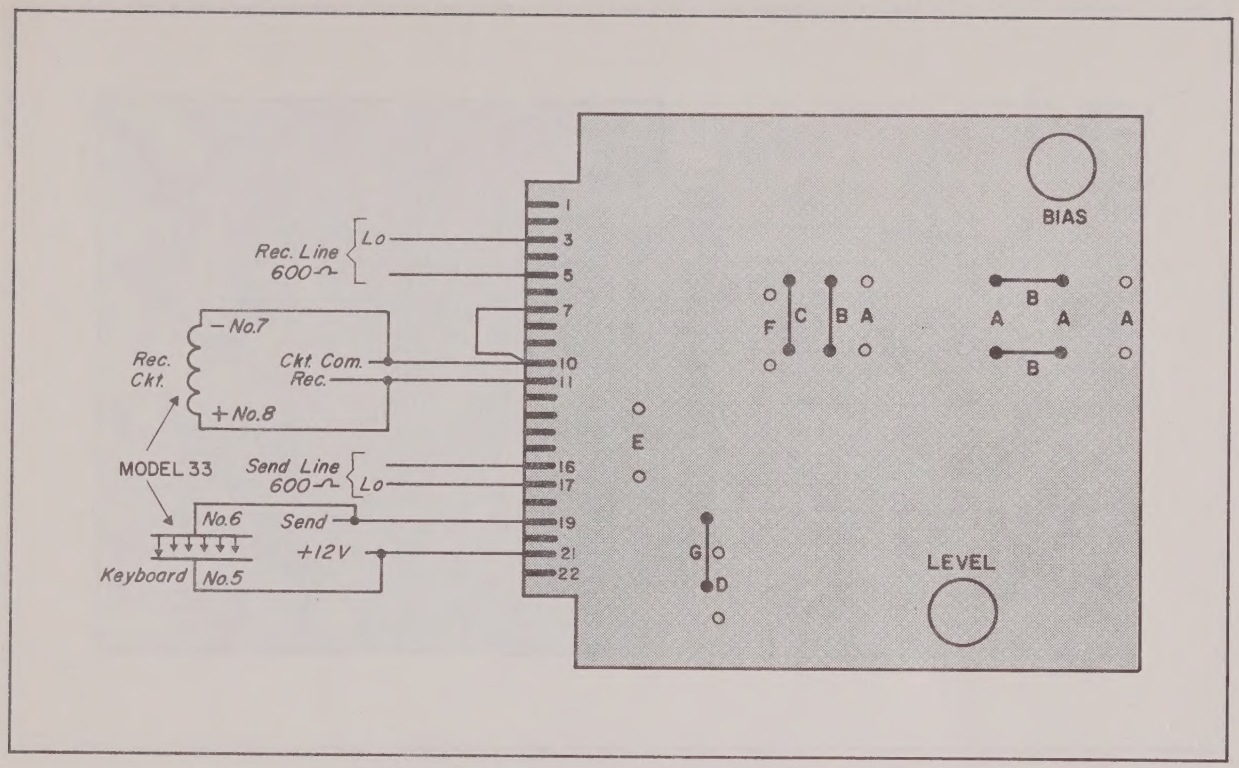


Figure 2. Full-Duplex TTY (Model 33) Interface.

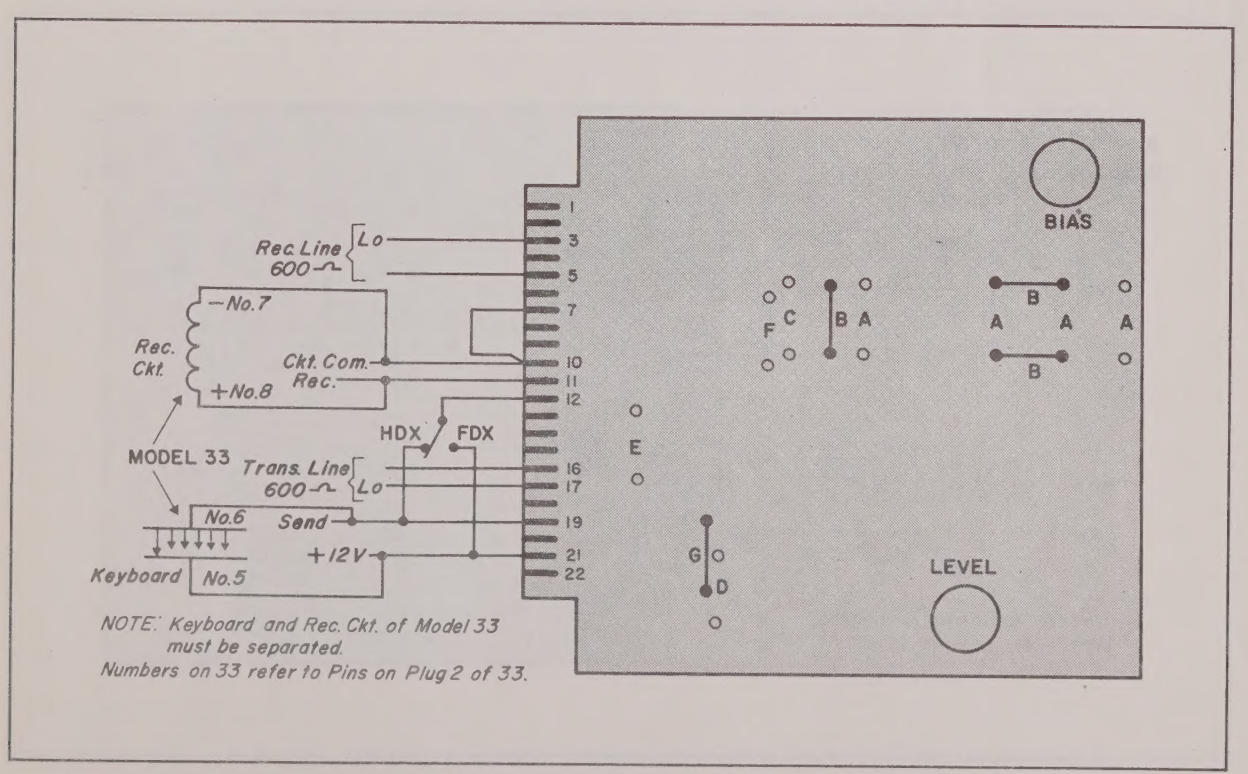


Figure 3. HDX-FDX Switchable TTY (Model 33) Interface.

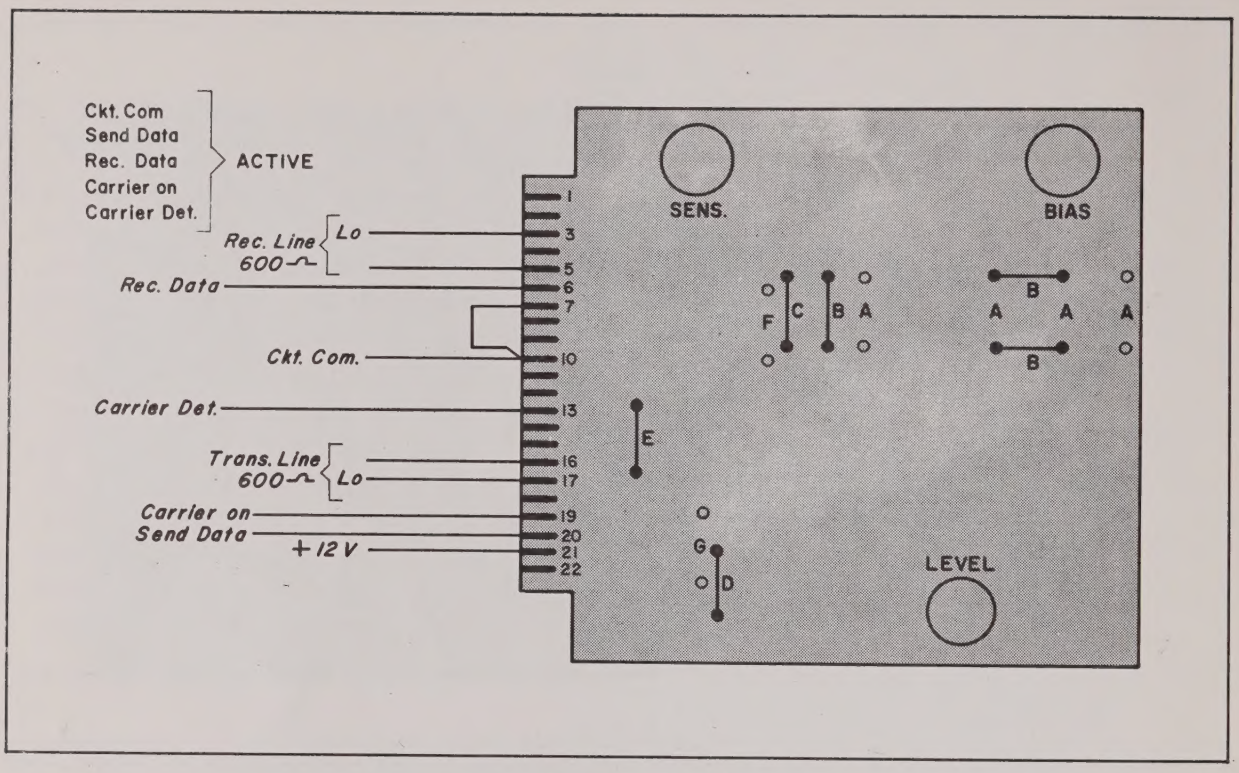


Figure 4. TTL-DTL Interface - Carrier On-Off Control.

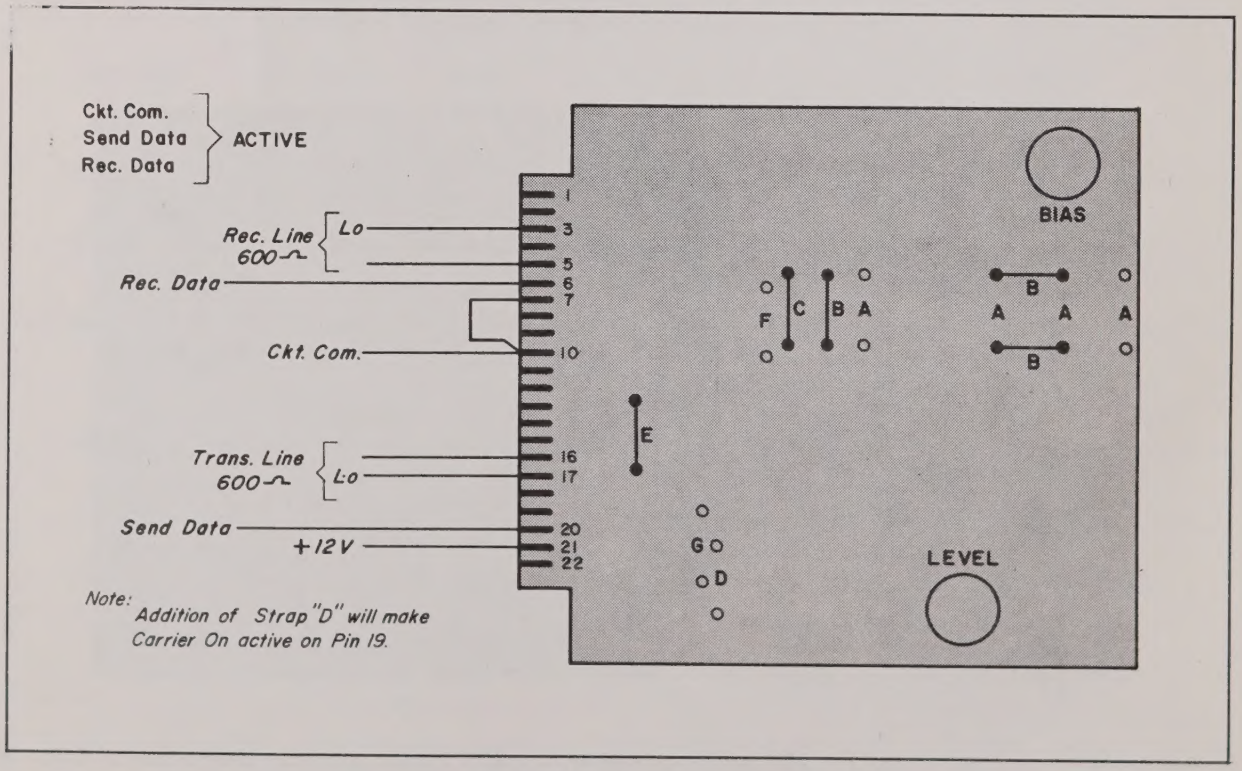


Figure 5. TTL-DTL Interface - Continuous Carrier.

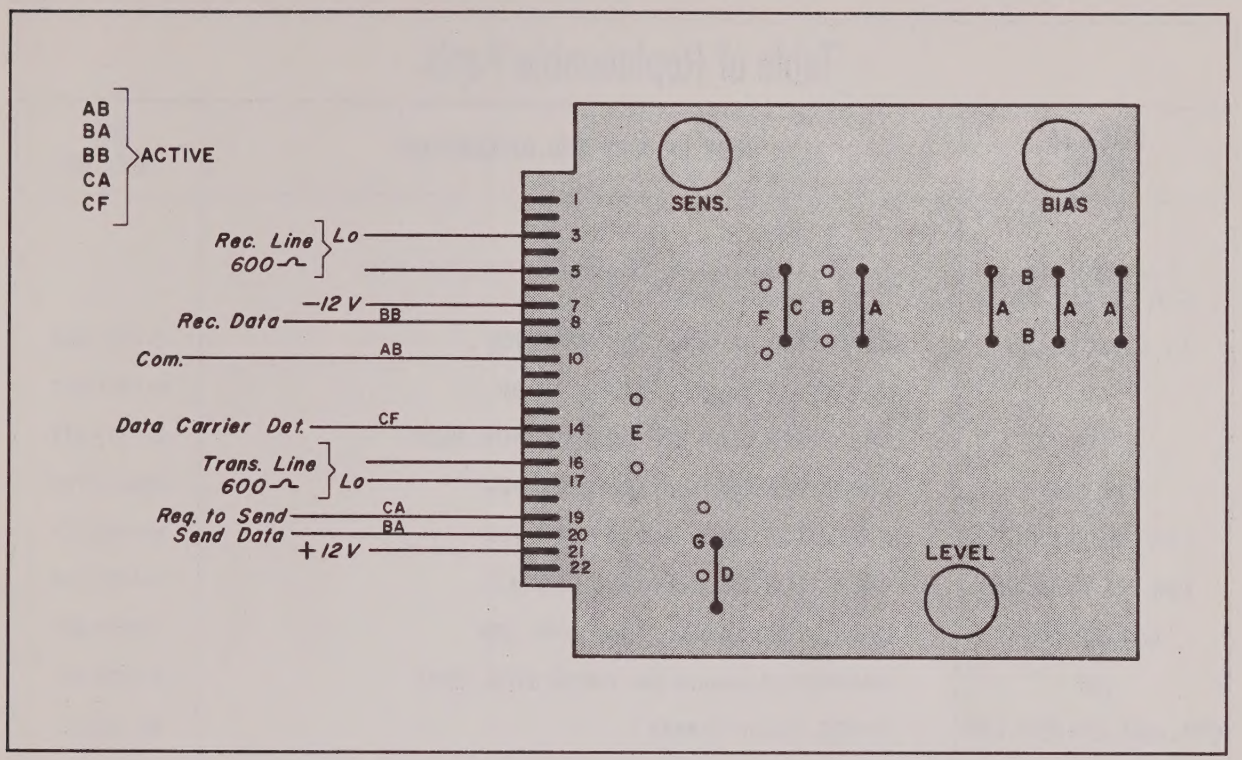


Figure 6. EIA Interface - Carrier On-Off Control.

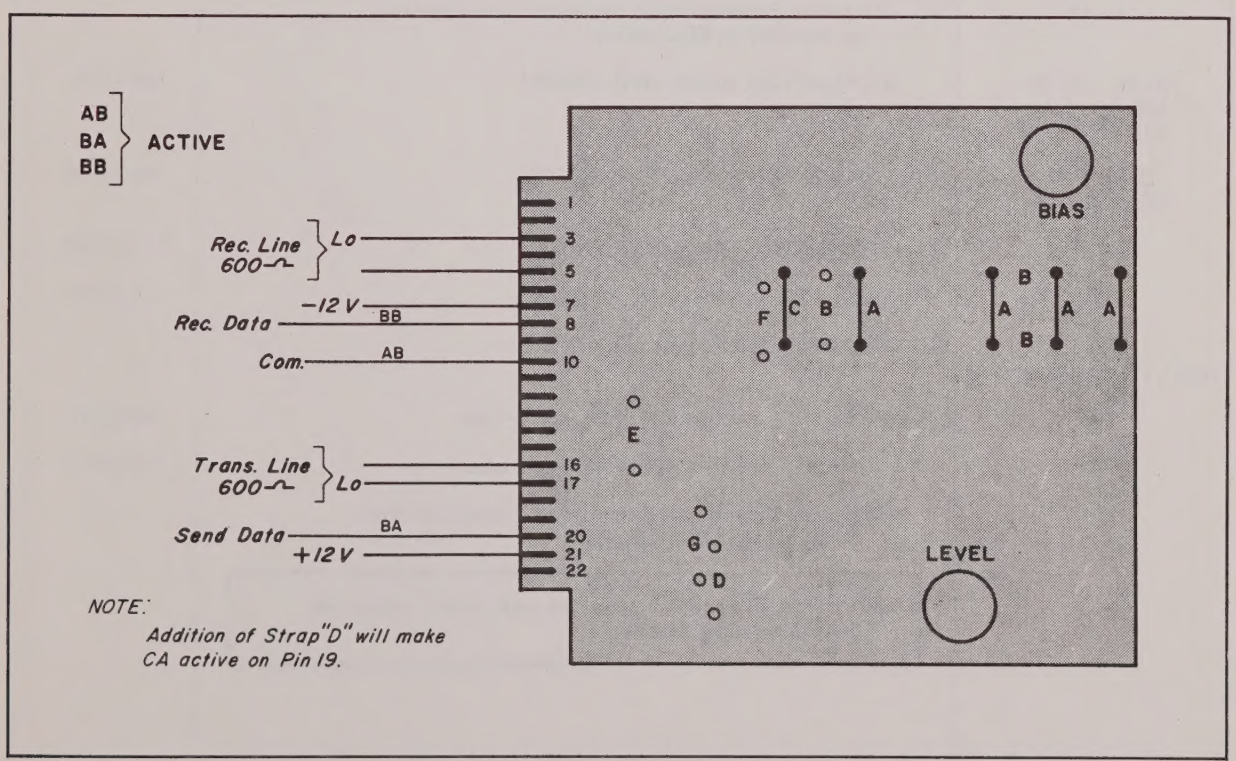
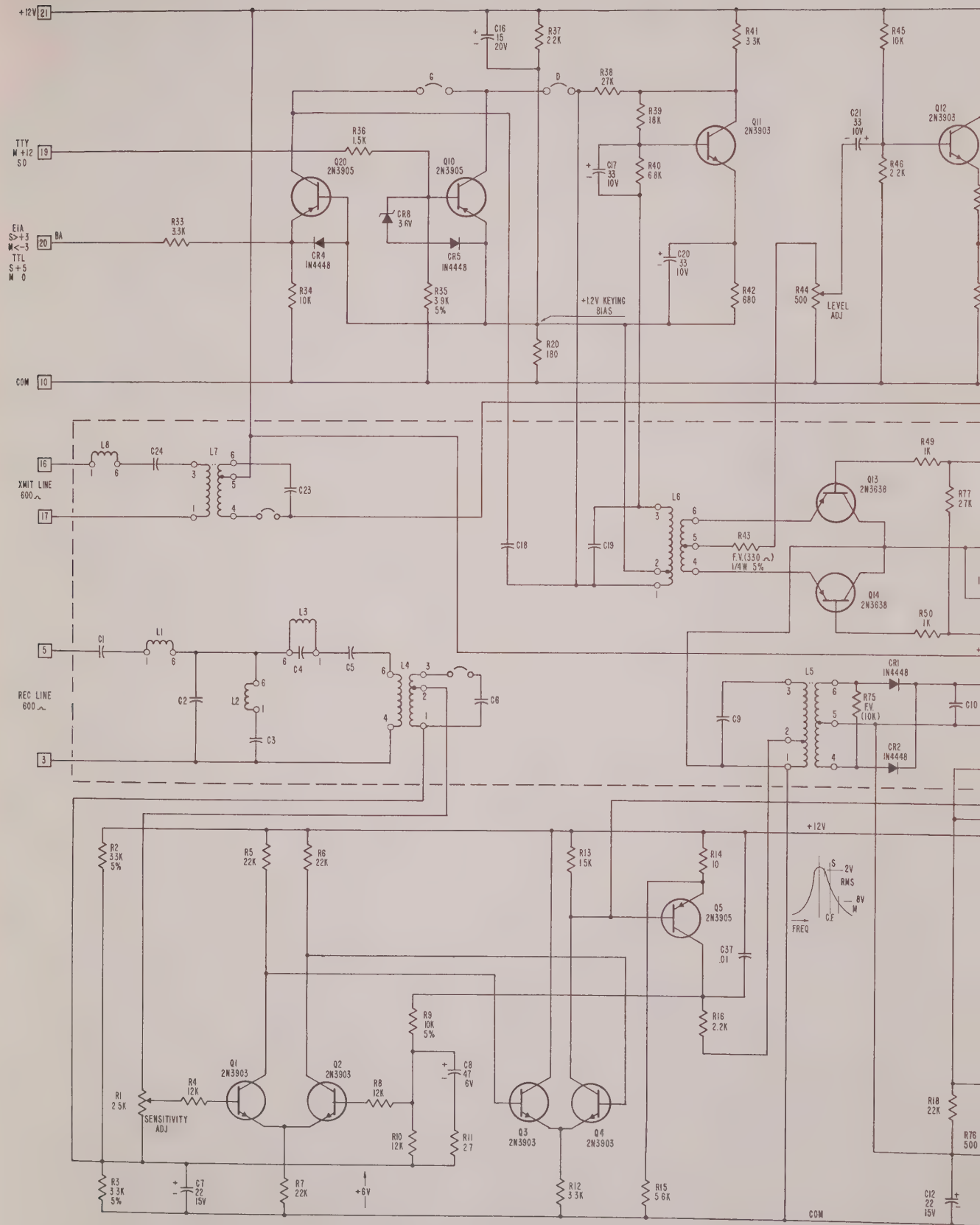


Figure 7. EIA Interface - Continuous Carrier.

Table of Replaceable Parts

DIAGRAM SYMBOL	NAME OF PART AND DESCRIPTION	RFL PART NO.
C1-C6, C9, C18, C19, C23-C26, C36	Frequency Determining Components - repairable only by assembly at RFL factory.	
C7, C12, C13, C34	CAPACITOR, tantalum: 22μF ±20%, 15V	H-1007-656
C8	CAPACITOR, tantalum: 47μF ±20%, 6V	H-1007-407
C14	CAPACITOR, paper film: 0.0047μF ±10%, 200V	H-1007-677
C15, C16	CAPACITOR, tantalum: 15μF ±20%, 70V	H-1007-716
C17, C20, C21, C22	CAPACITOR, tantalum: 33μF ±20%, 10V	H-1007-653
C25, C27, C28, C29	CAPACITOR, tantalum: 6.8μF ±20%, 6V	H-1007-916
C30-C33, C35	CAPACITOR, tantalum: 1.5μF ±10%, 20V	H-1007-528
C37	CAPACITOR, ceramic disc: 0.01μF ±20%, 500V	H-1007-83
CR1, CR2, CR4-CR7, CR9	DIODE, silicon: 1N4448	HA-29074
CR3	DIODE, zener: 5.1V ±5%, 1 W	HA-29759
CR8	DIODE, zener: 3.6V ±10%, 1 W	HA-35006
L1-L9	Frequency Determining Components - repairable only by assembly at RFL factory.	
Q1-Q4, Q6, Q7 Q9, Q11, Q12 Q15, Q16, Q19	TRANSISTOR, silicon: NPN, 2N3903	HA-21562
Q5, Q8, Q10, Q17, Q18, Q20	TRANSISTOR, silicon: PNP, 2N3905	HA-21564
Q13, Q14	TRANSISTOR, silicon: PNP, 2N3638	HA-24598
R1	RESISTOR, variable: 2.5K, audio taper	HA-35005
R2-R43, R45-R73, R74, R75, R77	RESISTOR, fixed comp.: see schematic	
R44	RESISTOR, variable: 500 ohms, audio taper	HA-35004
R76	RESISTOR, variable: 500 ohms, linear taper	HA-35007
T1	Frequency Determining Components - repairable only by assembly at RFL factory.	

NOTE: Not all symbol numbers are used in each model. See individual model schematic.


+12V 21
TTY M +12 S 0
19
EIA S>+3 M<-3 TTL S+5 M 0
BA 20
COM 10
XMIT LINE 600Ω
16
17
REC LINE 600Ω
5
3
C16 15 20V
R37 2.2K
R38 27K
R41 3.3K
R45 10K
G
D
R39 18K
Q11 2N3903
C21 33 10V
Q12 2N3903
R36 1.5K
Q20 2N3905
Q10 2N3905
C17 33 10V
R40 6.8K
R46 2.2K
CR8 3.6V
R33 3.3K
CR4 IN4448
CR5 IN4448
C20 33 10V
R34 10K
R35 3.9K 5%
+12V KEYING BIAS
R42 680
R44 500
LEVEL ADJ
R20 180
L8
C24
L7
C23
C18
C19
L6
R43 F.V.(330Ω) 1/4W 5%
R49 1K
Q13 2N3638
R77 27K
Q14 2N3638
R50 1K
L3
C1
L1
C4
C5
L4
C6
L2
C2
C3
L5
C9
CR1 IN4448
R75 F.V. (10K)
C10
CR2 IN4448
+12V
R2 3.3K 5%
R5 22K
R6 22K
R13 1.5K
R14 10
Q5 2N3905
C37 .01
R16 2.2K
2V RMS
8V
C.F
FREQ
R9 10K 5%
C8 47 6V
Q1 2N3903
Q2 2N3903
R1 2.5K
R4 12K
R8 12K
SENSITIVITY ADJ
R10 12K
R11 27
Q3 2N3903
Q4 2N3903
R18 22K
R76 500
R3 3.3K 5%
C7 22 15V
R7 22K
+6V
R12 3.3K
R15 5.6K
C12 22 15V
COM

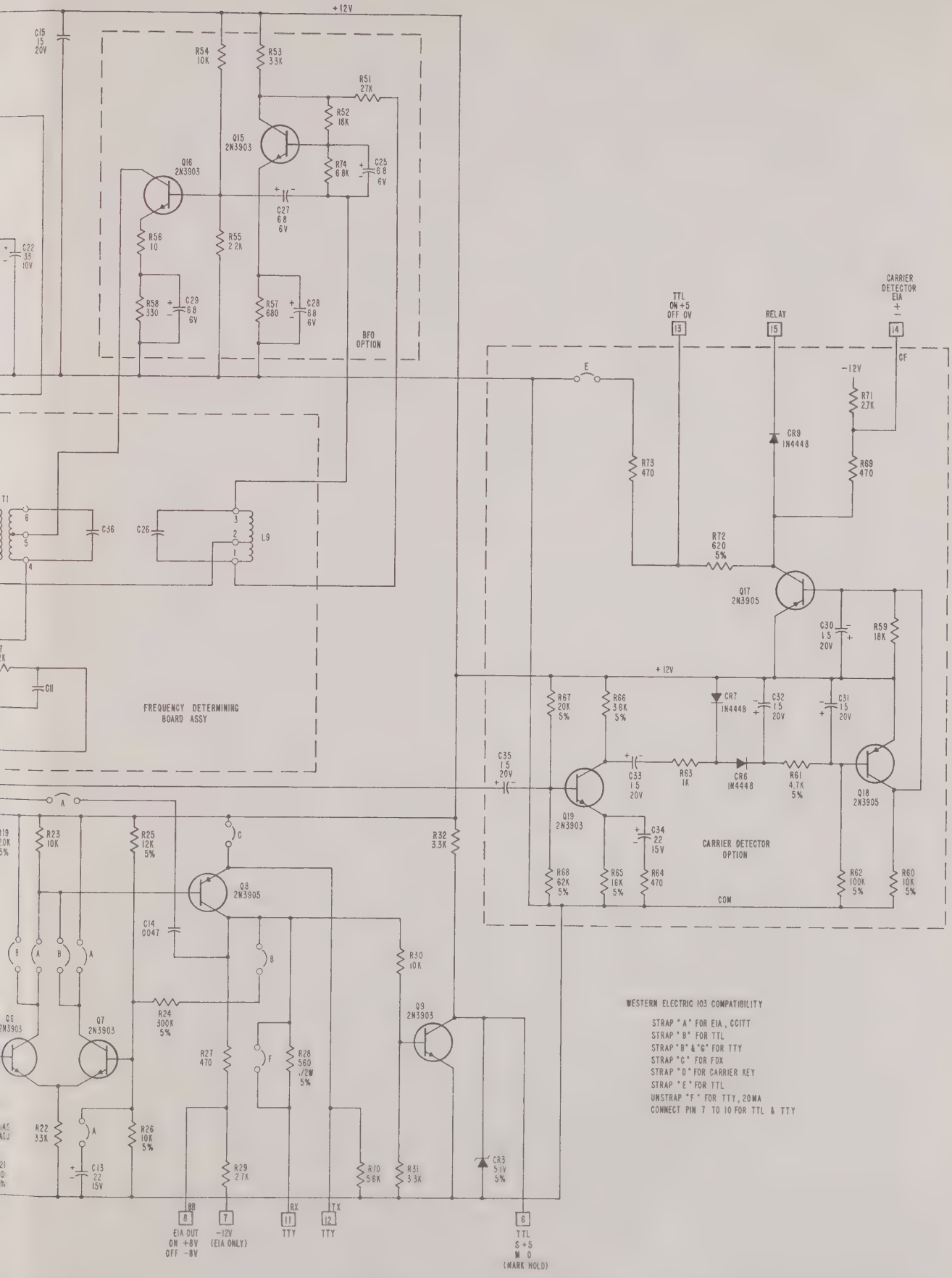
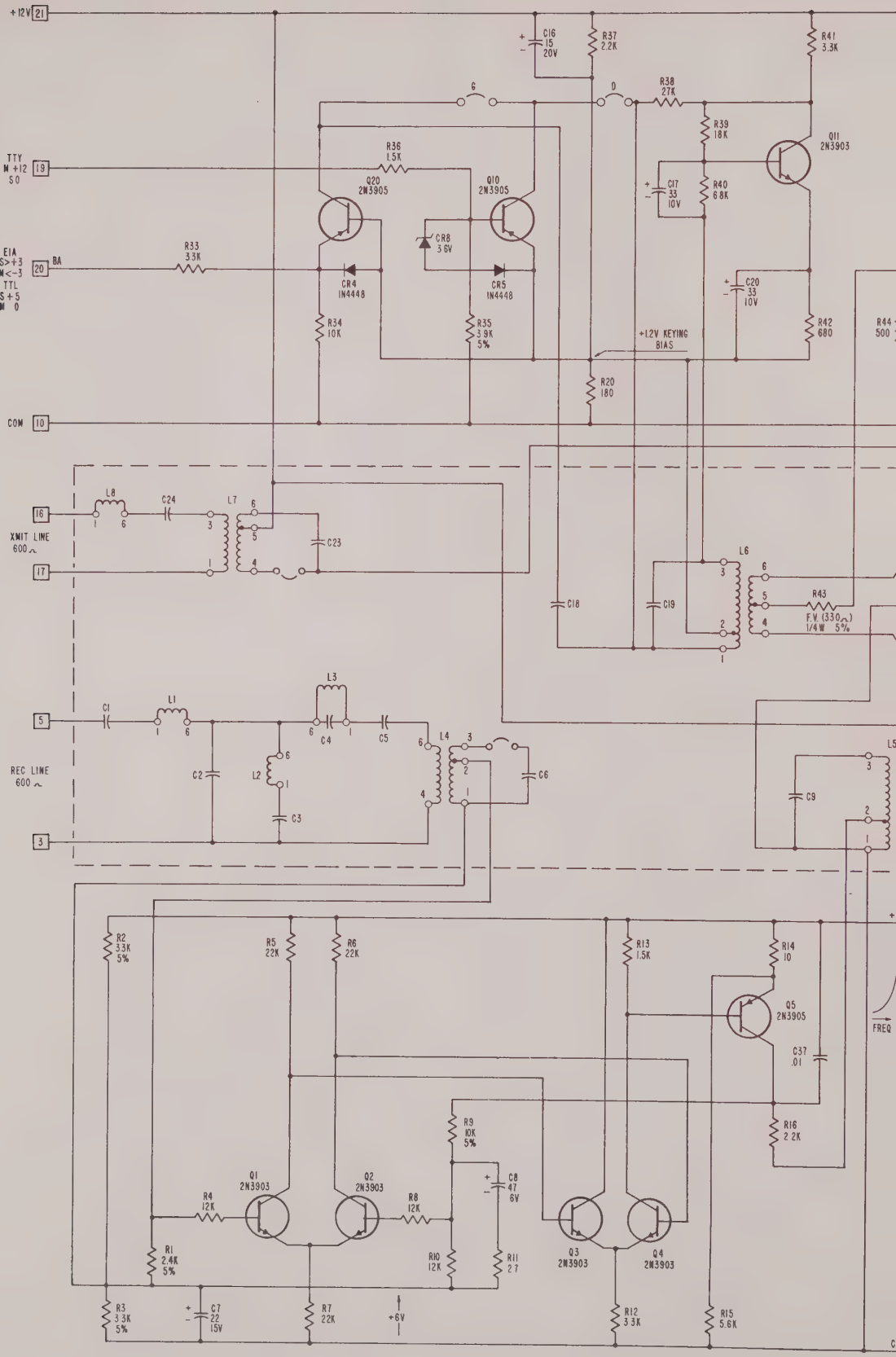


Figure 8. Schematic Diagram of RFL Model 5105 (with BFO and Carrier Detect).


+12V 21
C16 15 20V
R37 2.2K
R41 3.3K
G
D
R38 27K
R39 18K
Q11 2N3903
TTY M +12 S 0
19
R36 1.5K
Q20 2N3905
Q10 2N3905
C17 33 10V
R40 6.8K
EIA S>+3 M<-3 TTL S+5 M 0
20 BA
R33 3.3K
CR8 3.6V
CR4 IN4448
CR5 IN4448
C20 33 10V
R34 10K
R35 3.9K 5%
R42 680
+12V KEYING BIAS
R20 180
COM 10
16
XMIT LINE 600Ω
17
L8
C24
L7
C23
C18
C19
L6
R43 F.V. (330Ω) 1/4W 5%
5
REC LINE 600Ω
3
C1
L1
L3
C4
C5
L4
C6
C2
L2
C3
C9
L5
R2 3.3K 5%
R5 22K
R6 22K
R13 1.5K
R14 10
Q5 2N3905
C37 .01
FREQ
R16 2.2K
R9 10K 5%
C8 47 6V
Q1 2N3903
Q2 2N3903
R4 12K
R8 12K
R1 2.4K 5%
R10 12K
R11 2.7
Q3 2N3903
Q4 2N3903
R3 3.3K 5%
C7 22 15V
R7 22K
+6V
R12 3.3K
R15 5.6K

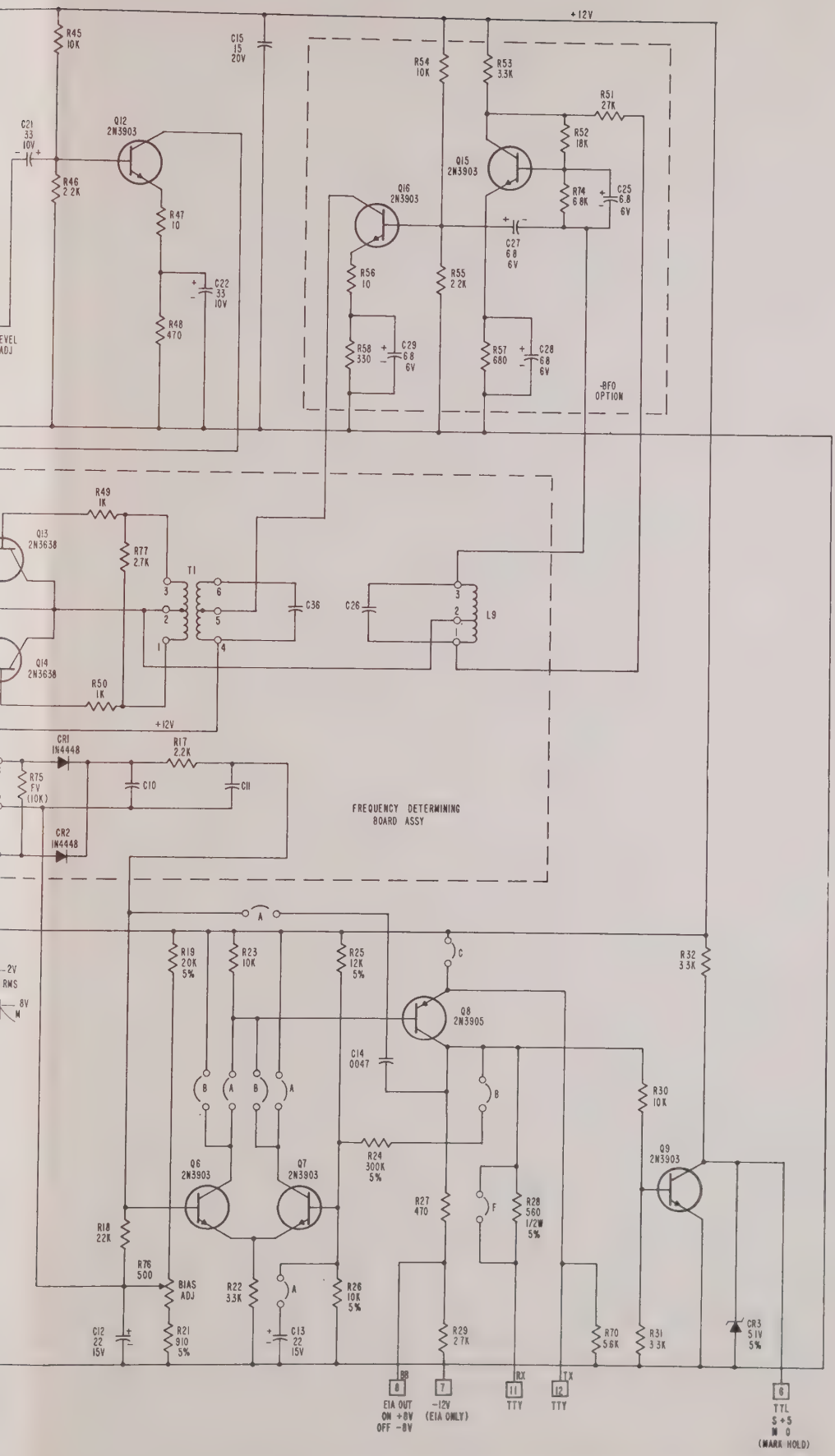
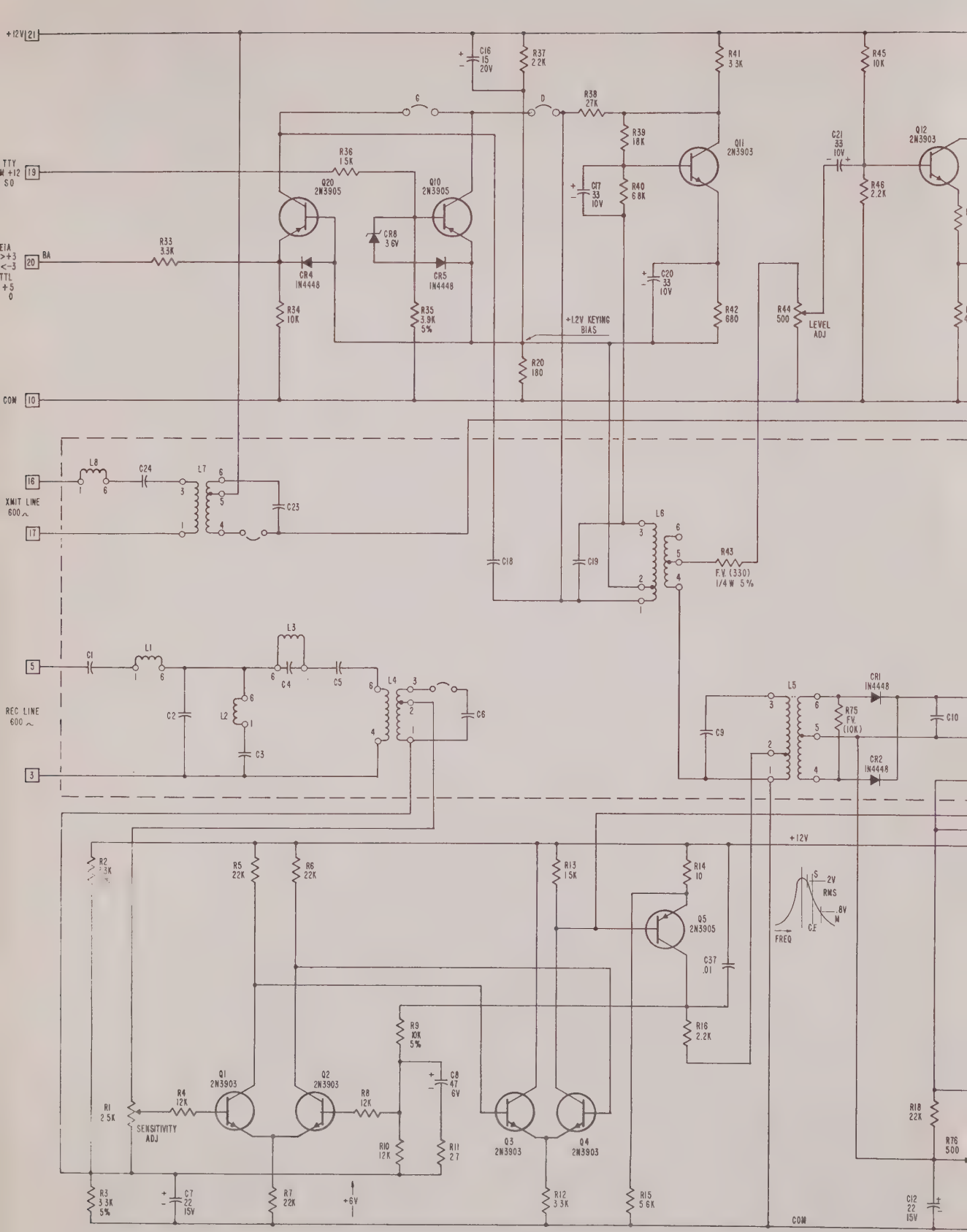


Figure 9. Schematic Diagram of RFL Model 5105 (with BFO, without Carrier Detect).


+12V
21
C16 15 20V
R37 2.2K
R41 3.3K
R45 10K
G
D
R38 27K
R39 18K
Q11 2N3903
C21 33 10V
Q12 2N3903
TTY W +12 S 0
19
R36 1.5K
Q20 2N3905
Q10 2N3905
C17 33 10V
R40 6.8K
R46 2.2K
EIA >+3 <-3 TTL +5 0
20
BA
R33 3.3K
CR8 3.6V
CR4 IN4448
CR5 IN4448
C20 33 10V
R34 10K
R35 3.9K 5%
+12V KEYING BIAS
R42 680
R44 500
LEVEL ADJ
R20 180
COM
10
16
L8
C24
L7
C23
XMIT LINE 600 ~
17
C18
C19
L6
R43 F.V. (330) 1/4W 5%
5
L3
C1
L1
C4
C5
L4
C6
REC LINE 600 ~
C2
L2
C3
3
L5
CR1 IN4448
CR2 IN4448
R75 F.V. (10K)
C9
C10
+12V
R2
R5 22K
R6 22K
R13 1.5K
R14 10
Q5 2N3905
C37 .01
2V RMS
.8V M
FREQ
R16 2.2K
R9 10K 5%
C8 47 6V
Q1 2N3903
Q2 2N3903
R4 12K
R8 12K
R1 2.5K
SENSITIVITY ADJ
R10 12K
R11 2.7
Q3 2N3903
Q4 2N3903
R18 22K
R76 500
R3 3.3K 5%
C7 22 15V
R7 22K
+6V
R12 3.3K
R15 5.6K
C12 22 15V
COM

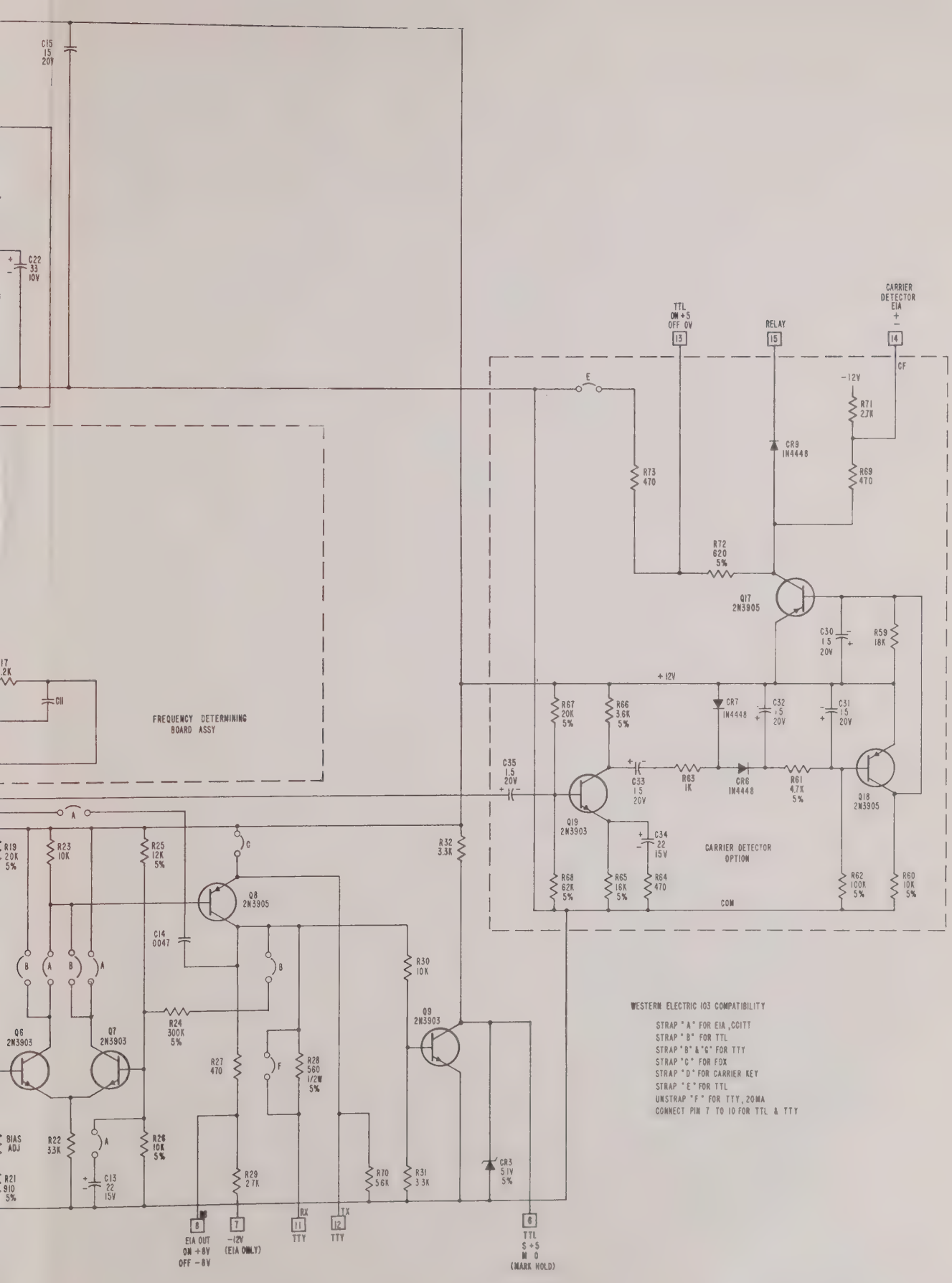
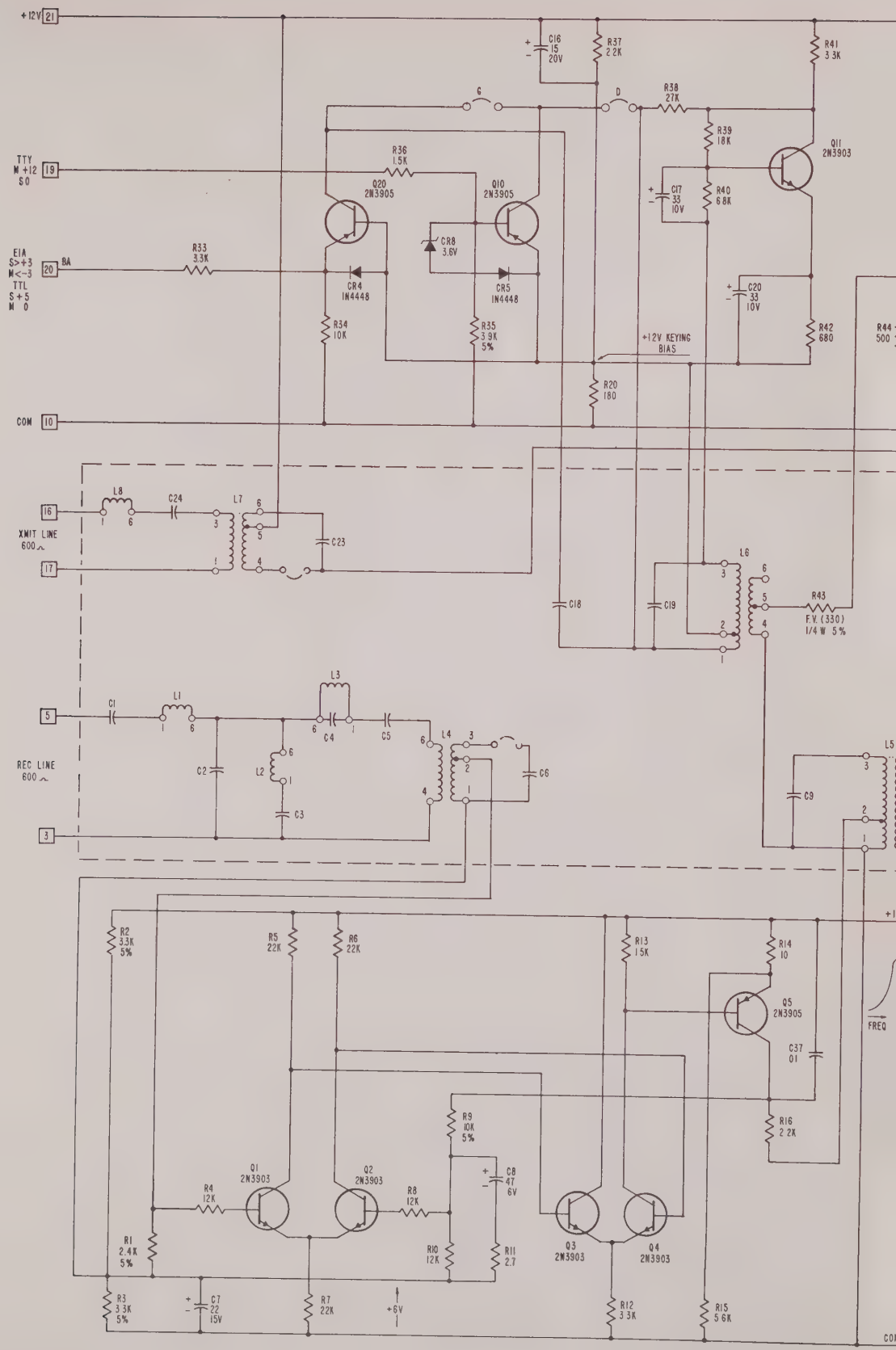
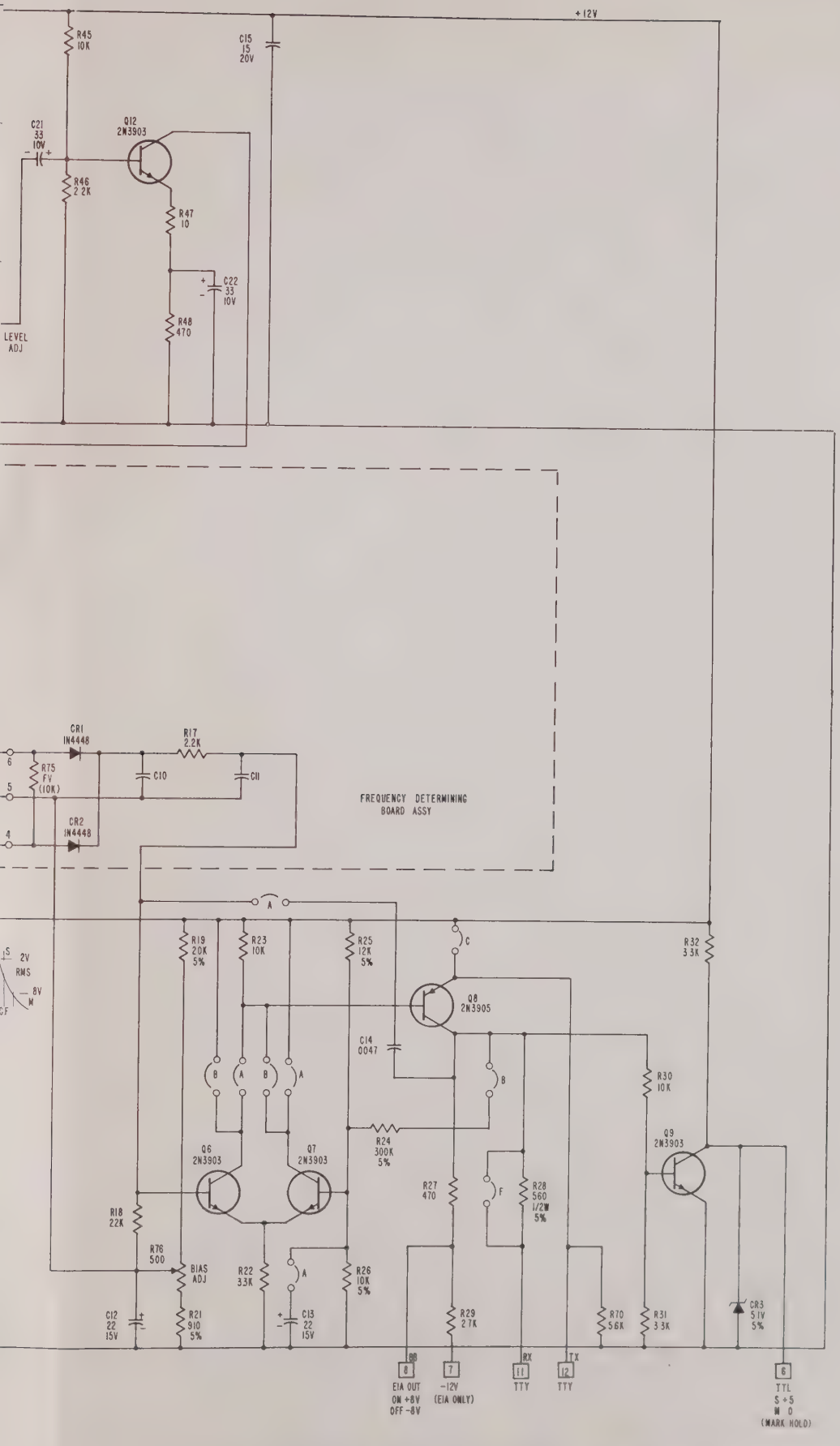


Figure 10. Schematic Diagram of RFL Model 5105 (without BFO, with Carrier Detect).


+12V 21
TTY M +12 S 0 19
EIA S>+3 M<-3 TTL S+5 M 0 20 BA
COM 10
XMIT LINE 600Ω 16 17
REC LINE 600Ω 5 3
C16 15 20V
R37 2.2K
R41 3.3K
R38 27K
R39 18K
Q11 2N3903
R36 1.5K
Q20 2N3905
Q10 2N3905
C17 33 10V
R40 6.8K
CR8 3.6V
R33 3.3K
CR4 IN4448
CR5 IN4448
C20 33 10V
R34 10K
R35 3.9K 5%
R42 680
+12V KEYING BIAS
R20 180
L8
C24
L7
C23
C18
C19
R43 F.V. (330) 1/4 W 5%
L3
C1
L1
C4
C5
L4
C2
L2
C6
C3
L5
C9
R2 3.3K 5%
R5 22K
R6 22K
R13 1.5K
R14 10
Q5 2N3905
C37 01
R16 2.2K
R9 10K 5%
Q1 2N3903
Q2 2N3903
C8 47 6V
R4 12K
R8 12K
R1 2.4K 5%
R10 12K
R11 2.7
Q3 2N3903
Q4 2N3903
R3 3.3K 5%
C7 22 15V
R7 22K
+6V
R12 3.3K
R15 5.6K
FREQ



WESTERN ELECTRIC 103 COMPATIBILITY

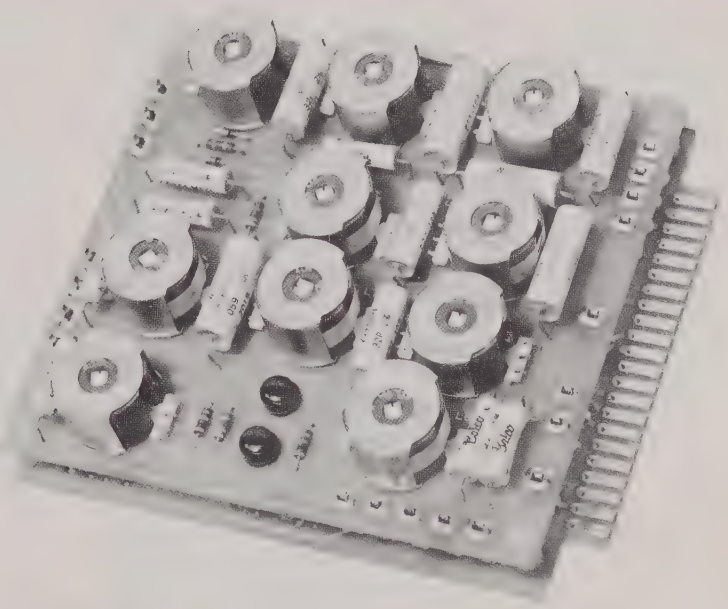
STRAP "A" FOR EIA, CCITT
STRAP "B" FOR TTL
STRAP "B" & "C" FOR TTY
STRAP "C" FOR FDX
STRAP "D" FOR CARRIER KEY
STRAP "E" FOR TTL
UNSTRAP "F" FOR TTY, 20MA
CONNECT PIN 7 TO 10 FOR TTL & TTY

Figure 11. Schematic Diagram of RFL Model 5105 (without BFO, without Carrier Detect).

RFL MODEL

5105

DATA SETS



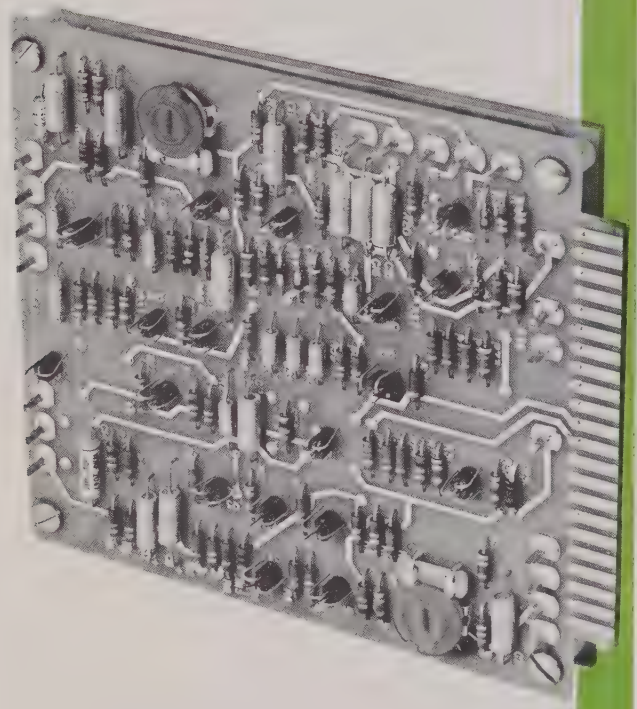
Our Economical Modem

A $95.00, compact, originate only modem compatible with Bell 103A2, 103E, and 103F models for OEM applications.

RFL Industries, Inc.
Boonton, New Jersey, U. S. A.

MODEL 5105PC CARD MODEM

- **LOW COST . . . $95.00**
- **COMPACT . . . 5" x 4¾" x 1½"**
- **VERSATILE . . . plug-in filters for FDM**
- **ADJUSTABLE . . . gain, sensitivity, bias, frequency**
- **WIDE TEMPERATURE RANGE . . . -20°C to +60°C**



The Model 5105 is a low cost, compact, Originate Only 103 Type Model for O.E.M. applications. The Model 5105 is compatible with Bell 103A2, 103E, and 103F models and will operate full-duplex at speeds up to 300 bps, is strappable for half-duplex and will interface to Bell Manual Couplers F-57951 (CDT). Under certain conditions, operation with the Bell Automatic Couplers F-58012 (CBS) and F-58118 (CBT) is possible. Bandpass filters provide minimum 60 dB adjacent channel rejection and greater noise immunity. In addition, RFL's "piggy back" filter concept permits the ability to assign operating frequencies for use in Answer Only and Frequency Division Multiplexing (FDM) applications.

Digital interface for EIA, CCITT, TTL, DTL, and Teletype with control functions — Signal Common, Transmitted Data, Received Data, and Request to Send; Data Carrier Detect is optional. The Transmit Signal Level is adjustable from 0 to -12 dBm and the Receiver Input Signal Level full limiting from 0 to -45 dBm, both with calibrated dial features. With all this, how can you miss — Try Our Economical Modem.

SPECIFICATIONS

Compatibility . . . Originate Only 103A2, 103E, or 103F

Operational Modes . . . Full or Half-Duplex

Transmission Speed . . . Up to 300 bps

Line Requirements . . . DDD Switched Network

Line Interface . . . Bell Manual Type Data Coupler F-57951 or 1000 A

Temperature Range . . . -20°C to +60°C

Construction . . . Dual printed circuit w/replacement filter

Dimensions . . . 5" x 4¾" x 1½"

Power Requirements . . . +12 Volts @60 mA; and −12 Volts @5 mA for EIA and CCITT only

Transmit Signal Level . . . 0 to -12 dBm (adjustable)

Receive Signal Level . . . 0 to -45 dBm (adjustable)

Adjacent Channel Rejection . . . 60 dB

Digital Interface . . . EIA, CCITT, TTL, DTL, and Teletype

Control Functions . . . Signal Common
Transmitted Data
Received Data
Request to Send

OPTIONS *

Carrier Detect Circuit

Plug-In Filter Assemblies with optional frequency assignments for use in Frequency Division Multiplexing applications.

Housing and Power Supply for stand alone applications

Acoustic Telephone Adapter Unit

**At additional cost depending on customer requirements.*

For additional information contact:

RFL Industries, Inc.
Communications Division
Powerville Road
Boonton, New Jersey 07005
Tel: 201-334-3100

LUSCOMBE ENGINEERING COMPANY
610 South Arroyo Parkway
Pasadena, CA 91101

Compact

LUSCOMBE ENGINEERING COMPANY
610 South Arroyo Parkway
Pasadena, CA 91101
(213) 684-2000

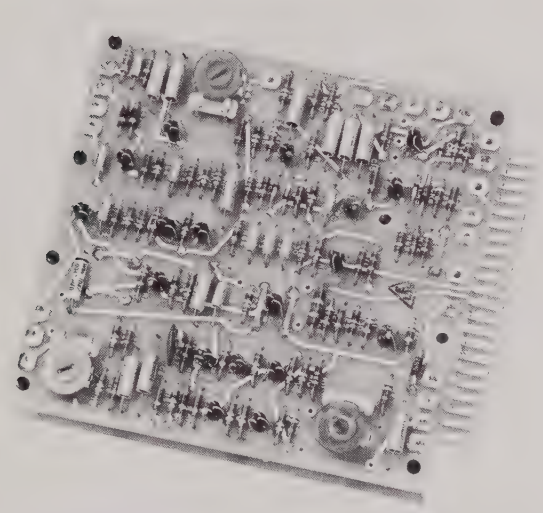
Up to 22 Channels

Full or Half Duplex Operation

Operates Over Two or Four-Wire Circuits

Separate Plug-in Transmitter and Receiver Frequency Selection

From $233.00



Description

RFL Model 5380 Frequency Division Multiplexer (FDM) is a single, card only, modular type modem transceiver designed and built for reliability and quality performance. The transceiver consists of a Frequency Shift Keying (FSK) transmitter and receiver in one double deck module. RFL's piggy-back filter concept permits the user to assign or reassign individual transmit and receive frequencies as the application requires. Bandpass filters provide for a minimum adjacent channel rejection of 40 dB for channels with a bandwidth of 85 Hz or greater.

Size of this compact FDM transceiver measures only 1½" H x 5" D x 4¾" W and plugs into a 22 pin edge connector. The 5380 is size compatible with the RFL Model 5105 Data Modem series.

The Model 5380 will interface with EIA, CCITT, TTL, DTL or Teletype digital interface. Data carrier detect is optional. The transmit signal level is adjustable from 0 to -25 dBm and the receiver input signal level is full limiting from 0 to -40 dBm. A calibrated dial is utilized with the transmit signal level control for adjustment convenience. Additionally, bias control provides for adjustment to zero bias distortion.

Specifications

Operation: Frequency Division Multiplexed (FDM)

Operational Modes: Full or Half-Duplex

Transmission Speed: Up to 600 bps

Line Requirements: Type 3002, unconditioned

Line Interface: Two or Four-Wire

Channel Density:
22 Channels @ 75 baud each
16 Channels @ 110 baud each
11 Channels @ 150 baud each
7 Channels @ 200 baud each
4 Channels @ 300 baud each
1 Channel @ 600 baud each

Temperature Range: -20°C to +60°C

Power Requirements: +12V DC @ 60 mA and -12V DC @ 5 mA for EIA and CCITT only.

Transmit Signal Level: 0 to -25 dBm (adjustable with calibrated dial feature)

Receive Sensitivity: 0 to -40 dBm (adjustable)

Adjacent Channel Rejection: 40 dB unflanked (except 60 BW/33 dB unflanked)

Digital Interface: EIA, CCITT, TTL, DTL, or Teletype

Dimensions: 1½" H x 5" D x 4¾" W

Control Functions:
Signal Common
Transmitted Data
Received Data
Request to Send
Data Carrier Detect (Optional)

Price: From $233.00

Options

Chassis Options for 5380 Mounting

5150 Chassis — Convertible, either desk or rack mounted. Chassis will accommodate up to eight Model 5380 Transceivers and one power supply.

5220 Chassis — Desk mounted. Chassis will accommodate one Model 5380 Transceiver and one power supply.

Other Chassis Options: Diagnostics for VF Loopback, Digital Loopback, Carrier Detect Indicator, Received Data Indicator.

For additional information contact:

RFL Industries, Inc.
Communications Division
Powerville Road
Boonton, New Jersey 07005
Tel: 201-334-3100

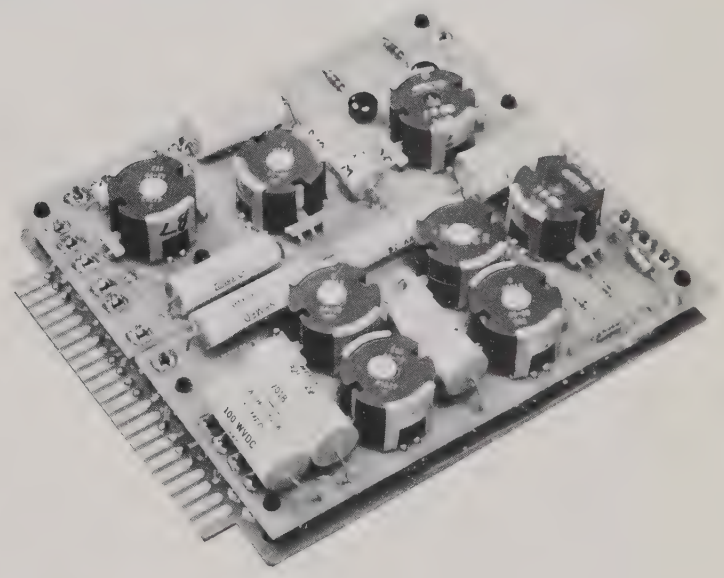
RFL MODEL

5380

F

D

M



Frequency Division Multiplex

transceiver

RFL Industries, Inc.
Boonton, New Jersey, U. S. A.

MULTIPLEX
modem system

RFL Industries, Inc.
Boonton, New Jersey, U. S. A.

Description

Communication line charges are one of the most expensive items in any on-line data processing system. Multiplexing is used to save telephone line charges by routing the data from a number of remote terminals over a single phone circuit to one central location. Using RFL's Multiplex Modem System reduces the cost, since the cost of a single phone circuit is much less than the multiple line charge for each remote terminal. In general, the purpose of multiplexing is to transfer a quantity of data at the lowest possible cost. RFL's 5150 Multiplex Modem System permits up to 24 channels (depending on baud rates) over a standard Bell System Type 3002 nonconditioned line or equal facility. The following chart designates the number of channels with reference to data rates:

24 channels @ 75 baud each
16 channels @ 110 baud each
12 channels @ 150 baud each
7 channels @ 200 baud each
4 channels @ 300 baud each
1 channel @ 600 baud each

The Model 5150 is designed in keeping with the latest concepts using state-of-the-art components for miniaturization and bookshelf type plug-in modules for up-grading as future requirements develop. Operating features are preset with internal strapping when the system is installed. No external adjustments are required.

A system is comprised of up to eight individual RFL Model 5380 PC FDM modems in an attractively designed housing with power supply. This type of packaging concept provides for maximum *economy, versatility, performance, and system adaptability*. Each module is 4¾" high and mounts in the standard desk top cabinet or a 19" rack chassis. Model 5105 Data Modem (300 baud) can also be used in the 5105 chassis.

The individual modules are PC card modems and contain the transmitter and receive circuitry. The "piggy-back" filter on the PC card provides any selection of line frequencies desired, by simply plugging in the appropriate filter. All modules provide the option of being strapped for EIA, CCITT, TTL, DTL, or Teletype interfaces.

All RFL Multiplex Modem Systems are serial for the individual terminal input and parallel by channel. All channels in the system are asynchronous and may be operated in either half or full-duplex modes for data rates up to 600 baud in each direction. Chart 1 delineates standard channel frequencies.

Applications

The Model 5150 Multiplex Modem System may be used for multiplexing and transmitting signals derived from data terminal, telemeter, supervisory control, and telegraph end devices. Digital data signals from these devices are converted to discrete frequencies, utilizing two frequency FSK, for application to virtually all communications circuits such as the DDD network, dedicated lines, and microwave. At the receive end these frequencies are converted to their original digital form suitable for operating end devices. Figure 1 depicts one of several multiplex system arrangements. Other systems include point to point, multipoint, and multipoint polled.

Channel assignments detailed in Chart 1 are those intended for use in a voice grade facility whose frequency spectrum is system limited. For applications where no such frequency limitation is imposed, RFL can supply channels up to a center frequency of 41,000 Hz.

For any individual remote site multiplex requirements, RFL's Model 5220 is completely compatible with the Model 5150 Multiplex Modem System. The 5220 mounting will accept either a 5380 or a 5105 Modem.

Technical Data

Operation: Frequency Division Multiplex (FDM)

Operational Modes: Full or Half-Duplex

Transmission Speed: Up to 600 bps

Line Requirements: Type 3002, unconditioned

Line Interface: Two or Four-Wire

Channel Density: Up to 24 channels at 75 bps (see Chart 1)

Temperature Range: -20°C to +60°C

Power Requirements: 115 or 230V AC, 50/60 Hz

Transmit Signal Level: 0 to -25 dBm (adjustable)

Receive Sensitivity: 0 to -40 dBm (adjustable)

Adjacent Channel Rejection: 40 dB unflanked (except 60 BW – 33 dB unflanked)

Digital Interface: EIA, CCITT, TTL, DTL, or Teletype

Dimensions: 17½" W x 5¾" H x 9½" D; standard 19" rack mounting also available

Control Functions: Signal Common
Transmitted Data
Received Data
Request to Send
Data Carrier Detect (optional)

Additional Features: Bias and Frequency Adjust;
Bell 103 Originate Only or
Answer Only service

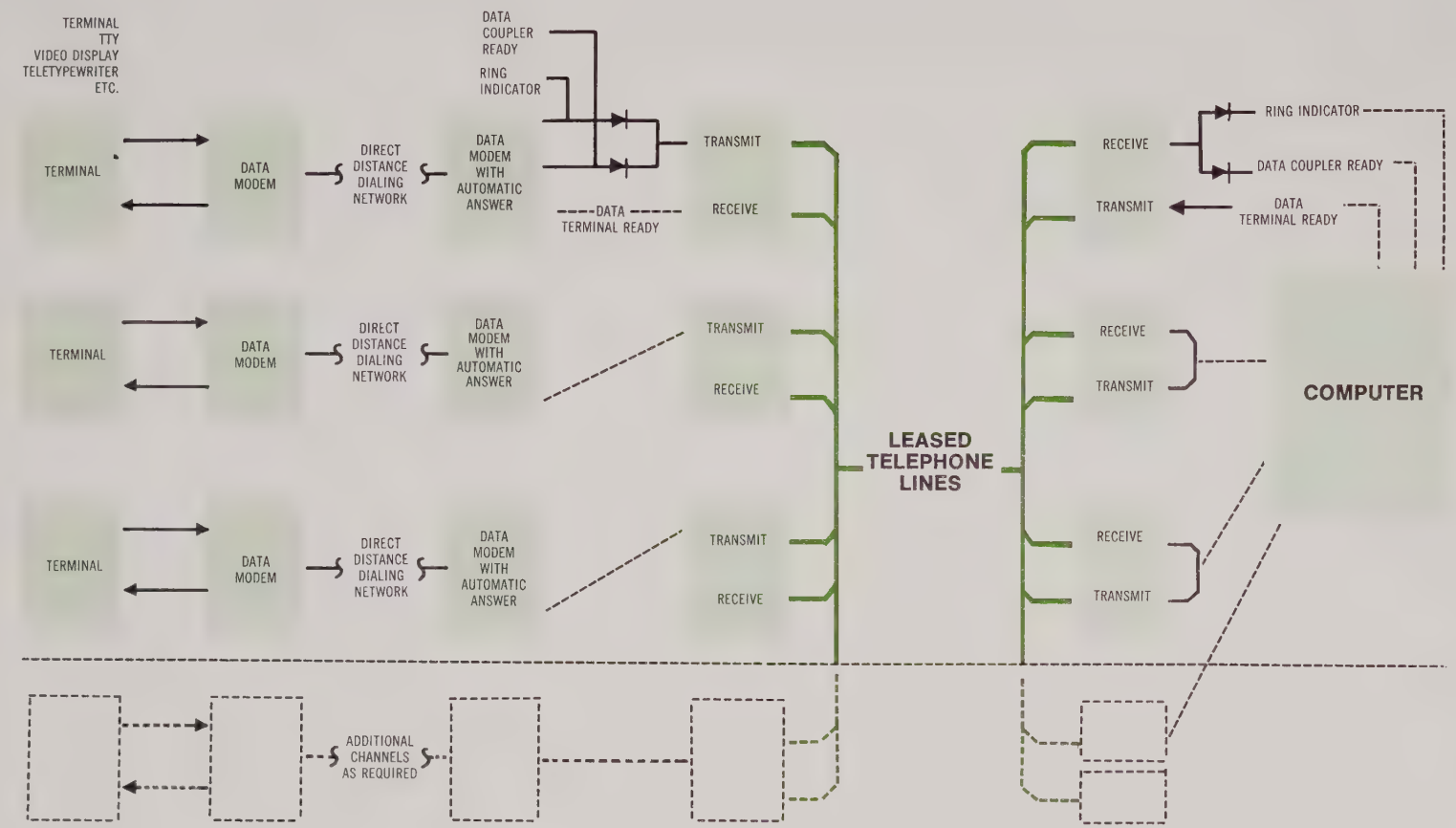


Figure 1. Typical Multiplex System

CHART 1
Standard Channel Frequencies

Data Rates (bps)	No. of Channels*	Channel Center Frequencies (Hz)†	Channel Spacing (Hz)†	Frequency Shift (Hz)	Application Notes
75	24	420, 540, 660, 780, 900, 1020, 1140, 1260, 1380, 1500, 1620, 1740, 1860, 1980, 2100, 2220, 2340, 2460, 2580, 2700, 2820, 2940, 3060, 3120	120	±30	5 Level Teletype, Slow Speed Control, Telemetering
110	16	425, 595, 765, 935, 1105, 1275, 1445, 1615, 1785, 1955, 2125, 2295, 2465, 2635, 2805, 2975	170	±42.5	5 or 8 Level Teletype, Telemetering
110	16	425, 595, 765, 935, 1105, 1275, 1445, 1615, 1785, 1955, 2125, 2295, 2465, 2635, 2805, 2975	170	±35	Compatible with Bell 43A1 and 43B1 Telegraph
150	12	480, 720 960, 1200, 1440, 1680, 1920, 2160, 2400, 2640, 2880, 3120	240	±60	Data Terminal to Computer Transmission, 150 word/minute Telegraph, Supervisory Control
200	7	595, 935, 1275, 1615, 1955, 2295, 2635	340	±85	Data Terminal to Computer Transmission, Supervisory Control
300	4	660, 1260, 1860, 2460	600	±120	Data Terminal to Computer Transmission, Computer to Computer, Supervisory Control
600	1	1700	----	±300	Four-Wire, Full-Duplex or Two-Wire, Half-Duplex, Data Terminal to Computer Transmission, Computer to Computer Full-Duplex Transmission, Supervisory Control

**Number of channels cited are for use on Bell System Type 3002 or equal facility without conditioning.*
†CCITT Frequencies and Spacing are also available.

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RFL Industries, Inc.
Communications Division • Boonton, New Jersey 07005
Tel: 201-334-3100/TWX: 710-987-8352/CABLE: RADAIRCO, N.J.

COMMUNICATIONS DIVISION
DATA MODEM PRICE LIST

Effective: October 1, 1973

Series 2056
- Bell 103A Equivalent 1
- Bell 202 Equivalent 2
- 1200/150 BPS Full-Duplex 3

Series 3952, 4604
- Bell 201 Equivalent 4

Series 5000
- Bell 101, 103 and 113 Equivalent 5

5380, Frequency Division Multiplex 5–6

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Price and Delivery Schedules are periodically issued as a general guide to show current prices and for estimating delivery time.

Because of prior sales and occasional production delays we are sometimes unable to give short time delivery on our various products.

Prices shown are f.o.b. Boonton, New Jersey.

DELIVERY: 45 TO 60 DAYS AFTER ACCEPTANCE OF ORDER

RFL Industries, Inc.
Boonton, New Jersey, U. S. A.

Series 2056DM Data Modems
Bell 103A Equivalents TTY–EIA Interface

(SEE ALSO MODEL 5105 FOR 103 EQUIVALENT)

MODEL	DESCRIPTION		BASIC MODEM OR UNIT NET PRICE
13AO/TTY	Originate Only Modem (with carrier indicator)		$ 258.00
	(without carrier indicator)		247.00
13AA/TTY	Answer Only Modem (with carrier indicator)		258.00
	(without carrier indicator)		247.00
13AO/TTY-AZ	Originate Only Modem		296.00
13AA/TTY-AZ	Answer Only Modem		296.00
13AO/BM/EIA	Originate Only Modem		275.00
13AA/BM/EIA	Answer Only Modem		275.00
OPTIONAL ITEMS			
HB-29557	TTY Cable		$ 30.00
HB-34320	Acoustic Adapter		60.00
HB-30917	Shelf for Acoustic Adapter		10.00
13AO/EIA	Originate Only Modem	(Rack Chassis)	$ 476.00
		(Desk Chassis)	495.00
13AA/EIA	Answer Only Modem	(Rack Chassis)	476.00
		(Desk Chassis)	495.00
13AO/EIA-AX	Originate Only Modem	(Rack Chassis)	504.00
		(Desk Chassis)	523.00
13AA/EIA-AX	Answer Only Modem	(Rack Chassis)	504.00
		(Desk Chassis)	523.00
13AO/EIA-AZ	Originate Only Modem	(Rack Chassis)	504.00
		(Desk Chassis)	523.00
13AA/EIA-AZ	Answer Only Modem	(Rack Chassis)	504.00
		(Desk Chassis)	523.00
13AA/EIA-AW	Answer Only Modem	(Rack Chassis)	472.00
		(Desk Chassis)	492.00
13AF/EIA	Originate & Answer Modem	(Rack Chassis)	612.00
		(Desk Chassis)	634.00
13AF/EIA-AX	Originate & Answer Modem	(Rack Chassis)	639.00
		(Desk Chassis)	662.00
13AF/EIA-AZ	Originate & Answer Modem	(Rack Chassis)	639.00
		(Desk Chassis)	662.00
OPTIONAL ITEMS			
HB-30965	Line Answering Module		$ 90.00
	(For optional item add $11.00 per module for chassis wiring).		

Series 2056DM Data Modems
Bell 202 Equivalents EIA Interface

MODEL	DESCRIPTION		BASIC MODEM OR UNIT NET PRICE
22DB/EIA	1200 Baud Modem	(Rack Chassis)	$ 847.00
		(Desk Chassis)	879.00
22DB/EIA-AX) 22DB/EIA-AS)	1200 Baud Modem	(Rack Chassis) (Desk Chassis)	887.00 919.00
22DB/EIA-AZ) 22DB/EIA-AT)	1200 Baud Modem	(Rack Chassis) (Desk Chassis)	887.00 919.00
22DB/202	1200 Baud Modem	(Rack Chassis)	936.00
		(Desk Chassis)	970.00
22DB/202-AX) 22DB/202-AS)	1200 Baud Modem	(Rack Chassis) (Desk Chassis)	976.00 1,010.00
22DB/202-AZ) 22DB/202-AT)	1200 Baud Modem 1200 Baud Modem	(Rack Chassis) (Desk Chassis)	976.00 1,010.00
OPTIONAL ITEMS			
HB-55199	Compromise Equalizer		$ 115.00
HB-17835-7	AM Transmitter (w/o Filter)		50.00
HB-56700-101	Transmitter Filter (387 Hz)		60.00
HB-24030-6	AM Receiver (w/o Filter)		80.00
HB-56500-111	Receiver Filter (387 Hz)		70.00
	(For optional items add $11.00 per module for chassis wiring except for Module HB-55199).		

Series 2056DM DATA MODEMS
1200/150 BPS Full-Duplex

MODEL	DESCRIPTION		BASIC MODEM OR UNIT NET PRICE
32DT/EIA	Asynchronous Data Modem	(Rack Chassis)	$ 807.00
		(Desk Chassis)	839.00
32DT/EIA/AX	Asynchronous Data Modem	(Rack Chassis)	847.00
		(Desk Chassis)	879.00
32DT/EIA-AZ	Asynchronous Data Modem	(Rack Chassis)	847.00
		(Desk Chassis)	879.00
32DR/EIA	Asynchronous Data Modem	(Rack Chassis)	946.00
		(Desk Chassis)	980.00
32DR/EIA-AX	Asynchronous Data Modem	(Rack Chassis)	986.00
		(Desk Chassis)	1,020.00
32DR/EIA-AZ	Asynchronous Data Modem	(Rack Chassis)	986.00
		(Desk Chassis)	1,020.00
OPTIONAL			
HB-55199	Compromise Equalizer		115.00

RFL Data Modems
EIA/DTL Interface-Bell 201 Equivalents

MODEL	DESCRIPTION		BASIC MODEM OR UNIT NET PRICE
3952	2400 BPS Data Modem (Desk Top)		$ 2,420.00
3952	2400 BPS Data Modem (Rack Mounted)		2,400.00
4604	2000 BPS Data Modem (Desk Top)		2,420.00
4604	2000 BPS Data Modem (Rack Mounted)		2,400.00
4604-AZ/AT	2000 BPS Data Modem (Desk Top)		2,520.00
4604-AZ/AT	2000 BPS Data Modem (Rack Mounted)		2,500.00
OPTIONAL ITEMS			
HB-68000	Compromise Equalizer		$ 115.00
HB-36810	12 Volt DC-DC Converter (In place of HB-29020 Power Supply)	Add	148.00
HB-36365	24 Volt DC-DC Converter (In place of HB-29020 Power Supply)	Add	165.00
HB-34180	External Sync Assembly (In place of HB-29070 Internal Sync)	Add	20.00
HB-33666	Card Extender		32.00
HB-33667	Card Extender (For use with HB-33668)		28.00
HB-33668	Card Extender (For use with HB-33667)		35.00

Series 5000 Price List

MODEL	DESCRIPTION	BREAKDOWN PRICE	BASIC MODEM OR UNIT NET PRICE
5105	Originate Only Series,Card Only (Compatible with Bell 101, 103, and 113 Series)		
	Originate Only Modem		$ 112.00
	Originate Only with Carrier Detect		124.00
	Originate Only with BFO		130.00
	Originate Only with Carrier Detect and BFO		135.00
5105	Answer Only Series,Card Only (Compatible with Bell 101, 103, and 113 Series)		
	Answer Only Modem		$ 148.00
	Answer Only with Carrier Detect		160.00
	Answer Only with BFO		166.00
	Answer Only with Carrier Detect and BFO		171.00
5220	Originate Only Data Set (Compatible with Bell 101, 103, and 113 Series)		
	Originate Only with Power Supply		$ 222.00
	Originate Only with Power Supply and Carrier Detect		234.00
	Originate Only with Power Supply and BFO		240.00
	Originate Only with Power Supply, Carrier Detect and BFO		245.00
	NOTE: Add $10.00 for EIA Interface		
5220	Answer Only Data Set (Compatible with Bell 101, 103, and 113 Series)		
	Answer Only with Power Supply		$ 258.00
	Answer Only with Power Supply and Carrier Detect		270.00
	Answer Only with Power Supply and BFO		276.00
	Answer Only with Power Supply, Carrier Detect and BFO		281.00
	NOTE: Add $10.00 for EIA Interface		
5380	Frequency Division Multiplex Transceiver with filter, without carrier detect, translated, for mounting in 5150 chassis		$ 238.00
	HB-36100 Transceiver	$ 98.00	
	HB-71300 Transmit Filter, translated	59.00	
	HB-71200 Receive Filter, 40 dB, OR	81.00	
	HB-71800 Receive Filter, 35 dB, 120 Hz Spacing	81.00	

MODEL	DESCRIPTION	BREAKDOWN PRICE	BASIC MODEM OR UNIT NET PRICE
5380	Frequency Division Multiplex Transceiver with filter and carrier detect, translated, for mounting in 5150 chassis		$ 240.00
	HB-36105 Transceiver	$ 100.00	
	HB-71300 Transmit Filter, translated	59.00	
	HB-71200 Receive Filter, 40 dB, OR	81.00	
	HB-71800 Receive Filter, 35 dB, 120 Hz Spacing	81.00	
5380	Frequency Division Multiplex Transceiver with filter, without carrier detect, not translated. For card only, 5150 or 5220 mounting.		$ 233.00
	HB-36100 Transceiver	$ 98.00	
	HB-71100 Transmit Filter, not translated	54.00	
	HB-71200 Receive Filter, 40 dB, OR	81.00	
	HB-71800 Receive Filter, 35 dB, 120 Hz Spacing	81.00	
5380	Frequency Division Multiplex Transceiver with filter and carrier detect, not translated. For card only, 5150 or 5220 mounting.		$ 235.00
	HB-36105 Transceiver	$ 100.00	
	HB-71100 Transmit Filter, not translated	54.00	
	HB-71200 Receive Filter, 40 dB, OR	81.00	
	HB-71800 Receive Filter, 35 dB, 120 Hz Spacing	81.00	
5380	Frequency Division Multiplex Transceiver with filter and carrier detect, BF Oscillator, translated, for card only or 5220 mounting.		$ 266.00
	HB-34853 Transceiver	$ 105.00	
	HB-72400 Transmit Filter, translated w/BFO	80.00	
	HB-71200 Receive Filter, 40 dB, OR	81.00	
	HB-71800 Receive Filter, 35 dB, 120 Hz Spacing	81.00	
	MOUNTINGS		
5220	Single Unit Desk Mount with Power Supply Standard		$ 125.00
5220	Single Unit Desk Mount with Power Supply EIA		135.00
5220	Single Unit Desk Mount with Power Supply EIA (Chassis HB-35355-1)		160.00
	HB-35305 Power Supply	$ 40.00	
	HB-35300 Chassis - Standard	85.00	
	HB-35355 Chassis - EIA	95.00	
	HB-35355-1 Chassis - EIA w/VF and DC Loopback Carrier Detector & Rec. Data Indicators (Optional)	120.00	
5150	Eight Unit Rack Mount with Power Supply Standard		$ 525.00
5150	Eight Unit Rack Mount with Power Supply EIA		645.00
5150	Eight Unit Rack Mount with Power Supply and BFO - Standard		569.50
5150	Eight Unit Rack Mount with Power Supply and BFO - EIA		689.50
	HB-35090 Power Supply	$ 150.00	
	HB-35530 BF Oscillator (Additional to HB-35090)	44.50	
	HB-35000 Chassis - Standard — Wired	375.00	
	HB-37760 Chassis - EIA — Wired	495.00	
	HB-37770 VF and DC Loopback Panel w/carrier detect and Rec. Data Indicators (Optional Addition)	256.00	
	ACCESSORIES		
HB-37125	Card Extender		$ 75.00

Warranty

RFL Communications Equipment carries a warranty of 12 months from date of delivery for replacement of any part which fails during normal operation or service. A deficient part should be returned to the factory, shipping charges prepaid, for replacement f.o.b. Boonton, New Jersey.

RFL Industries, Inc.
Boonton, New Jersey, U. S. A.

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